REMARKS

This Amendment is filed with a Request for Continued Examination and in response to the Final Office Action mailed on May 30, 2006 and the Interview conducted with the Examiner. All rejections and objections are respectfully traversed.

Claims 1-7, 9-12 and 21-41 are in the case.

Claims 1-2, 4, 6, 9, 21-22, 26, 29, 31, and 33-35 have been amended. The Examiner is respectfully directed to page 22, line 27 to page 24, lines 18, i.e. the section titled "Searching Multiple Regular Expressions in Parallel," among other places in the Specification, for support for these amendments.

Claim 8 has been cancelled.

New claims 36-41 have been added.

The Specification has been amended to correct a typographical error.

Claims Rejected Under 35 U.S.C. § 101

At pages 2-3 of the Final Office Action mailed on May 30, 2006, claims 1-12 and 21-35 were cited under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Specifically, the Examiner asserted that "independent claims 1, 8, and 22 only recite a program per se[, because these claims] do not execute any action if there is no match between a sub-expression and a string." (Office Action dated May 30, 2006, page 2). Applicant respectfully traverses the rejection.

Claim 1, representative in part of the other rejected claims, sets forth:

1. A method for operating a pattern matching engine having a plurality of information storage entries with two or more regular expressions, each regular expression including a plurality of characters and each regular expression associated with a corresponding action to be applied when matching strings are found, the method comprising the steps of:
identifying one or more borders within each regular expression, the one or more borders separating the regular expression into a plurality

of sub-expressions, each sub-expression having a plurality of sequential characters;

loading each of a plurality of entries of the pattern matching engine with the plurality of the sequential characters from one of the sub-expressions, wherein the borders are defined by a predetermined sequence of regular expression metacharacters, and the entries stored in content addressable memory (CAM);

determining in parallel that sub-expressions of each regular expression matches a string within a network message; and

executing the corresponding actions associated with the regular expressions on the network message.

Claim 1 thus recites the steps of *"determining in parallel that sub-expressions of each regular expression matches a string within a network message"* and *"executing the corresponding actions associated with the regular expressions on the network message"*.

The Applicant believes the Examiner's concern that the claims "do not execute any action if there is no match between a sub-expression and a string" is now moot. Applicant now affirmatively recites in the claims, *"determining in parallel that...,"* thereby directing the claim to the cases where a concrete and tangible result is achieved.

Further, in reference to claims 26 and 31, the Examiner states these claims "only recite an abstract idea" and "do not state/accomplish a tangible result." The Applicant respectfully directs the Examiner's attention to the preamble of claims 26 and 31 which states *"An apparatus"* and to the claim elements which include reference to *"a content addressable memory (CAM)."* An apparatus and a CAM are both tangible structures and certainly not abstract ideas. Further, the claims include structures for performing a tangible action upon a network message. For example, claim 26 states *"means for executing the corresponding action... on the network message."* Several examples of actions upon network messages are discussed in the specification. *See e.g.* Specification page 9, lines 3-15; page 14, lines 23-27; page 24, lines 24-28.

Accordingly, Applicant respectfully urges that claims 1-12 and 21-35 satisfy 35 U.S.C. § 101.

Claims Rejected Under 35 U.S.C. § 112, Second Paragraph

At pages 3-4 of the Office Action, claims 1-12 and 21-35 cited under 35 U.S.C. § 112, second paragraph, as being indefinite.

In regards to claims 1, 26, and 31, the Examiner comments that "it is not clear how a regular expression has a corresponding action, it is further not clear what the corresponding actions are."

First, the Applicant respectfully points out that the claims now recite "each regular expression associate with a corresponding action."

Second, Applicant respectfully urges that the meaning of corresponding actions is clear in light of the specification and the language in the claims.   As a preliminary matter, the Applicant respectfully refers the Examiner to MPEP §2173.04, which states in part:

2173.04 Breadth Is Not Indefiniteness

Breadth of a claim is not to be equated with indefiniteness. *In re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). If the scope of the subject matter embraced by the claims is clear, and if applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. 112, second paragraph.

In the specification, the meaning of "corresponding actions" is made clear by examples at numerous places. *See e.g.* Specification page 9, lines 3-15; page 14, lines 23-27; page 24, lines 24-28. For example, Specification, page 9, lines 3-15 provides examples of some types of actions (emphasis added):

A network manager responsible for servers 108-112 may wish to identify the particular types of traffic attempting to contact and obtain services from these servers so that appropriate treatments may be applied to that traffic. For example, the network administrator may wish to *block*

outside access to certain web sites and/or web pages hosted by web server 108. Alternatively, the network manager may wish to *identify attempts to contact specific web pages* at servers 108 and 110 (e.g., electronic commerce pages) *so that this traffic may receive higher priority* within network cloud 120. The identity of such web pages may be specified by the particular uniform resource locators (URLs) contained in the network messages sent to web servers 108 and 110. Similarly, the network manager may wish to *identify the particular application attempting to contact or connect* to database server 112 *so that traffic corresponding to mission-critical applications* (e.g., processing customer invoices) *can be given higher priority, while less important applications* (e.g., bulk file transfers) *can be given lower priority.*

Third, an exemplary association between regular expressions and corresponding actions is also illustrated in the Specification. *See e.g.* Specification page 12, line 29 – page 13, line 16; page 14, lines 10-13. The Specification at page 12, line 29 to page 13, line 8 states (emphasis added):

> In the illustrative embodiment, the regular expression storage device 324 further includes a second memory structure or device 320, such as *a random access memory (RAM), that is associated with CAM 304 and programmed, as described below, to contain the actions or treatments that are to be applied to network messages matching the regular expressions contained within the CAM 304.* In particular, both the CAM 304 and the RAM 320 include a plurality of information storage entries or rows. Each entry or row of the CAM 304, moreover, includes a pointer that particularly identifies, e.g., addresses, a corresponding entry (i.e., a location) of the RAM 320 as indicated by arrow 322. That is, there is a one-to-one correspondence between CAM entries and RAM entries.

Because, the meaning of corresponding actions is believed to be sufficiently clear and since the association between the regular expressions and corresponding action is believed to be clear, the Applicant respectfully urges the claims 1, 26, and 31, and any dependent claims that depend therefrom, satisfy 35 U.S.C. § 112, second paragraph.

Claims Rejected Under 35 U.S.C. § 103(a)

At pages 4-7 of the Office Action, claims 1-12 and 21-35 were cited under 35 U.S.C. § 103(a) in regards to Fritchman, U.S. Patent No. 6,785,677 B1, issued on Aug. 31, 2004 (hereinafter "Fritchman") in view of Sherman, U.S. Patent No. 6,389,507 B1, issued on May 14, 2002 (hereinafter "Sherman").

Claim 1, representative in part of the other rejected claims, recites:

1. A method for operating a pattern matching engine having a plurality of information storage entries with two or more regular expressions, each regular expression including a plurality of characters and each regular expression associated with a corresponding action to be applied when matching strings are found, the method comprising the steps of:

    identifying one or more borders within each regular expression, the one or more borders separating the regular expression into a plurality of sub-expressions, each sub-expression having a plurality of sequential characters;

    loading each of a plurality of entries of the pattern matching engine with the plurality of the sequential characters from one of the sub-expressions, wherein the borders are defined by a predetermined sequence of regular expression metacharacters, and the entries stored in content addressable memory (CAM);

    determining in parallel that sub-expressions of each regular expression matches a string within a network message; and

    executing the corresponding actions associated with the regular expressions on the network message.

Fritchman discloses a client submitting SQL queries to a server, which then searches a database for any records matching the SQL queries. *See* Fritchman, Fig. 1; col. 9, lines 14-26. Fritchman divides the SQL queries into a prefix, a suffix, and an interior segment for separate processing of each. *See* col. 3, lines 49-53. "[T]he pattern [of the prefix, suffix, or interior segment] is applied to each database value in turn." *See* Fritchman, col. 8, lines 13-14 (emphasis added). Fritchman makes clear each prefix suffix and interior segment is processed separately as a series of sequential steps: a suffix-matching step (col. 8, lines 25-37; Fig. 4A); a prefix-matching step (col. 8, lines 38-51; Fig. 4B); and an interior segment-matching step (col. 8, line 52 – col. 9, line 14; Fig. 4C).

Sherman generally discloses a method for using a RAM as a CAM, to reduce the cost and increase the packaging efficiency of the CAM. *See* Sherman, col. 2, lines 31-40.

Neither reference suggests the Applicant's claimed *"determining in parallel that sub-expressions of each regular expression matches a string within a network message"* or *"executing the corresponding actions associated with the regular expressions on the network message."*

First, Applicant claims *"determining in parallel that sub-expressions of each regular expression matches a string within a network message."* In contrast, Fritchman suggests that prefixes, suffixes, and interior segments should be matched one at a time. Fritchman makes no suggestion that segments may be matched in parallel. While fully sequential matching may be acceptable for database applications, such as those disclosed in Frichman, can be unsuitable for use in processing network messages at high speeds, e.g., at multi-gigabit per second rates. Indeed, the Applicant comments on the unsuitability of slow implementations, stating at page 5, line 24 to page 6, line 5 of the specification (emphasis added):

> The use of advanced network equipment, such as fiber optic transmission links and high-speed transmission protocols, such as "Gigabit" Ethernet, further increase the speeds of these traffic flows. Furthermore, regardless of the processing power of the device's CPU (e.g., 16, 32 or even 64 bit), *regular expression matching can typically only be performed one byte at a time, due to programming constraints.*

> Thus, the current software solutions for performing regular expression matching are becoming less efficient at performing their message processing tasks as transmission rates reach such high speeds. Accordingly, a need has arisen for a system that can perform regular expression matching at the high transmission speeds of current and future computer network equipment.

Furthermore, the deficiencies in Frichman are not remedied by combination with Sherman. Even assuming arguendo that Sherman discloses the type of parallel matching claimed, since Frichman teaches fully sequential matching, one would have to selectively

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ignore many teachings in Frichman. Such selective disregard for teachings strongly indicates improper hindsight in the combination. Yet, Sherman does not even suggest the type of parallelism claimed by the Applicant. That is, although Sherman discloses a CAM, a CAM generally attempts to match *a single query* directed to the CAM against all entries within the CAM. A conventional CAM does not generally match a plurality of different queries against a string, all in parallel. Thus, the Applicant's claimed *determining in parallel that sub-expressions of each regular expression matches a string within a network message* is not suggested even by the combination of Sherman and Frichman.

Second neither reference suggests the Applicant's claimed *"executing the corresponding actions associated with the regular expressions on the network message"* Frichman simply performs a SQL query on a database and generates a "TRUE" or a "FALSE" result, and the process is complete. *See* Figs. 4A-4C, elements 77-78, 88-89, 98-99, 101-102. Sherman is concerned simply with CAM memory and is silent regarding actions on network messages as well. As discussed above, the Applicant's Specification illustrates several exemplary *corresponding actions* that may be applied to network messages Accordingly, Applicant respectfully urges that the combination of Fritchman and Sherman does not suggest the claimed *"executing the corresponding actions associated with the regular expressions on the network message."*
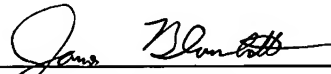
Therefore, Applicant respectfully urges that Fritchman and Sherman, either taken singly or taken in combination, are legally insufficient to render the claims obvious under 35 U.S.C. § 103(a) because of the absence from both references of *"determining in parallel that sub-expressions of each regular expression matches a string within a network message"* or *"executing the corresponding actions associated with the regular expressions on the network message."*

All dependent claims are believed to be dependent from allowable independent claims and likewise in condition for allowance.

Favorable action is respectfully solicited.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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